

APPLICABILITY OF NUTRIENT MANAGEMENT STANDARD (590) FOR DEVELOPMENT OF PHOSPHORUS BASED PLANNING

The USDA-NRCS mandated implementation of the new P based Nutrient Management Standard (590) has been delayed to allow for consistency with the PA Nutrient Management Act. However, Nutrient Management Plans may be developed voluntarily or under other mandates using the new 590 Standard, dated May 2001.

Voluntary nutrient management planning, using the new standard, will be encouraged. An interim version of the Phosphorus Index referenced in this standard will be made available during scheduled P based training for nutrient management planners and reviewers. A finalized version will be available by October 1, 2001.

All other nutrient management plans will continue to be developed using the existing Interim 590 Practice Standard which is dated February 1991 or in conformance with applicable regulations.

CONSERVATION PRACTICE STANDARD

NUTRIENT MANAGEMENT (ACRE)

CODE 590

DEFINITION

Managing the amount, source, placement, form and timing of the application of nutrients and soil amendments.

PURPOSE

- To properly utilize manure or organic by-products as a plant nutrient source.
- To budget and supply nutrients, including those from commercial fertilizers, for plant production.
- To minimize agricultural non-point source nutrient pollution of surface and groundwater resources.
- To maintain or improve the physical, chemical and biological condition of soil.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all agricultural land where plant nutrients and soil amendments are applied.

CRITERIA APPLICABLE TO ALL PURPOSES

General

Plans for nutrient management shall comply with all applicable federal, state, and local laws and regulations.

- This standard has been developed in accordance with all Federal, State and Local Regulations including consideration of the Pennsylvania Department of Environmental Protection, Manure Management Manual and the Pennsylvania Nutrient Management Act.

- Third party persons who write nutrient management plans under this standard shall be certified under the Pennsylvania Nutrient Management Act. NRCS may require additional training to implement NRCS Policy.
- A nutrient budget for nitrogen, phosphorus, and potassium shall be developed. This shall include all manageable potential sources of nutrients including, but not limited to, animal manure and organic by-products, bio-solids, waste water, commercial fertilizer, crop residues, legume credits, and irrigation water.
- Realistic yield goals shall be established based on soil productivity information, historical yield data, climatic conditions, level of management and/or research on similar soil, cropping systems, and soil test levels. For new crops and/or varieties and new technology, industry yield recommendations may be used.
- Nutrient management plans shall specify the form, source, amount, timing and method of application of nutrients on "management units" to achieve realistic production goals, while minimizing nitrogen and/or phosphorus movement to surface and/or ground waters.
- Conservation practices (BMPs) to address soil erosion, soil quality and water quality concerns, shall be planned and installed on all management units that receive nutrients.

Soil Sampling and Laboratory Analysis (Testing) for Nutrient Management Planning

Soil samples shall be collected, prepared and analyzed according to the guidance provided by The Pennsylvania State University (PSU). Soil test analyses shall be performed by laboratories that are accepted in The North American Proficiency Testing Program (NAPT) of the Soil Science Society of America. Soil testing shall

include, as a minimum, analysis for lime requirement, pH, phosphorus and potassium. Soil tests shall be no older than three years.

Nitrogen Tests

Pre-Sidedress Nitrogen Testing (PSNT) or other similar tests such as the Chlorophyll Meter Test, may be used as management tools when conducted according to current PSU guidance.

Plant Tissue Testing

Tissue sampling and testing, where used, shall be done in accordance with current PSU guidance.

Nutrient Application Rates

Nutrient and lime recommendations shall be based on current PSU and/or similar industry guidelines. Planned rates of applied nutrients, as documented in the nutrient budget, shall be determined based on guidance provided in this standard.

When determining nitrogen application rates, consider available nitrogen from all sources including residual N from previous manure and legumes.

Nutrient Application Method and Timing

Timing and method of nutrient application should correspond as closely as practical with plant nutrient uptake characteristics, while considering cropping system, land cover, management limitations, weather and climatic conditions, and field accessibility.

Starter Fertilizers

Recommendations for the application of starter fertilizers containing nitrogen, phosphorus and potassium shall be in accordance with current PSU guidelines. When starter fertilizers are used they should be included in the nutrient budget with applicable N and P limitations.

Liming Materials

Liming materials shall be applied as needed to adjust soil pH to the specific range for the crop for optimum availability and utilization of nutrients. Recommendations shall be in accordance with current PSU guidelines.

Field Evaluation of Phosphorus

When animal manure, commercial fertilizer, bio-solids or other organic by-products are applied, a site-specific assessment using the current Pennsylvania Phosphorus Index will be used to determine the risk for phosphorus loss by land management unit. In addition to BMPs needed to address soil loss, BMPs which reduce potential phosphorus loss should be considered under all Phosphorus Index ratings.

Nutrient management plans shall include documentation of the phosphorus index rating for each management unit. These ratings shall be discussed with the producer.

ADDITIONAL CRITERIA TO ADDRESS MANURE, BIOSOLIDS OR OTHER ORGANIC BY-PRODUCTS USED AS PLANT NUTRIENTS

Nitrogen Application

Volatilization losses may occur when manure is not incorporated by rain or tillage.

For application of nitrogen on legumes nitrogen applications shall not exceed the estimated nitrogen removal in harvested plant bio-mass during the year of application.

Phosphorus Application

A single application of P, when applied as manure, may be made at a rate equal to the recommended annual P application, or the recommendation for multiple years, such as a crop rotation. These recommendations may be combined into a single application to facilitate practical manure spreading.

When applying P in a single application for multiple years, additional manure may not be applied until the end of the multiple-year period. In no case can the application exceed the nitrogen requirement or N crop utilization for a given year.

Potassium Application

Utilize soil test recommendations whenever possible to avoid excess potassium levels which may cause unacceptable nutrient imbalances in crop or forage quality leading to animal health problems.

Determining Nutrient Values for Manure, Biosolids or Other Organic By-Products

Manure, biosolids and other organic by-products shall be sampled and analyzed for nutrient content to include as a minimum percent solids, total N, ammonium N, P and K. This shall be done prior to application (generally using recommendations from previous year's sampling and analyses) with the exception of the first year of a new operation or new storage facility. In this instance it is acceptable to use book values with a test taken in the first year and the plan revised to reflect the actual test results.

Continued sampling will be needed until the analysis becomes consistent over a period of years.

Nutrient values shall be based on the following as appropriate:

- Laboratory analysis conducted according to current PSU guidance.
- Current edition of PSU Agronomy guide book values.
- Other current acceptable book values recognized by NRCS including the Agricultural Waste Management Field Handbook and the DEP Manure Management Manual.

Calculating Manure Production

Manure production rates shall be based on book values from the current edition of the PSU Agronomy Guide, the Agricultural Waste Management Field Handbook, the DEP Manure Management Manual or by using actual farm records. Manure production shall be calculated using average animal size for the operation and be adjusted as needed for high producing dairy herds or for other animals when properly documented.

Land Application of Manure

The following apply to land application of manure to protect the environment and are consistent with the Pennsylvania DEP Field Application Supplement to the Manure Management Manual:

- Manure shall not be fall/winter applied unless permanent vegetation exists, a cover crop is established or crop residues exceed 25% at the time of spreading. Preference shall be given to permanent vegetative cover, established cover crop, high residue levels, flatter slopes and fields utilizing appropriate BMPs.
- Observe appropriate setbacks when applying manure adjacent to the following sensitive areas:
 - Wells, springs and public water supplies
 - Streams, lakes and ponds
 - Open sinkholes
- Agricultural wastes should not be land applied on soils that are frequently flooded, as defined by the National Cooperative Soil Survey, during periods when flooding is expected.
- Manure should never be applied at rates that result in direct runoff of manure from the field.

Manure Irrigation

- In addition to nutrient limitations, when liquid wastes are applied by irrigation, the application rate (in/hr) shall not exceed the infiltration rate of the soil, and the amount of waste applied shall not exceed the moisture holding capacity at the time of application.
- Wastes shall not be irrigated on frozen, saturated or snow-covered soils. Manure should never be irrigated at rates that result in direct runoff of manure from the field.

Land Application of biosolids and other regulated organic wastes

When land applying biosolids or other regulated organic waste products, the appropriate setbacks, management practices, and site restrictions must be followed as required in the applicable permit and state regulations.

CONSIDERATIONS

The following should be considered based on site specific situations and the producers' management objectives:

- Nutrients should be applied in such a manner as not to degrade soil structure, chemical properties, or biological condition. Nutrients should not be applied when the potential for soil compaction is high.
- Use cover crops whenever possible to protect the soil surface, add plant biomass to the soil and to utilize and recycle residual nitrogen and other nutrients.
- Use conservation practices such as Cover and Green Manure Crops (340), Crop Rotations (328), Conservation Tillage (329 A, B, or C), Crop Residue Management (344), Contour Buffer Strips (332), Contour Strip Cropping (585) and Contour Farming (330) to improve soil nutrient and water storage, infiltration, aeration, tilth, diversity of soil organisms and to protect or improve water quality.
- Capability of the application equipment when recommending application rates.
- Split applications of nitrogen to provide nutrients at the times of maximum crop utilization.
- Band applications of recommended phosphorus fertilizer near the seed row.
- Minimize the impact of odors of land applied wastes by making application at times when temperatures are cool and when wind direction is away from neighbors, or by incorporation or injection.
- Apply materials uniformly at recommended rates, or as prescribed by precision agricultural techniques.
- Use plan reviews to determine if changes in the nutrient budget are needed for the next cropping season.
- Sample the soil surface for phosphorus accumulation or pH changes, on sites with special environmental concerns.
- Modify animal feed/rations, based on new technology, to reduce nutrient content of manure.

- Apply manure or organic by-products on pasture and hayland immediately after harvesting.

PLANS AND SPECIFICATIONS

The following components shall be included in the nutrient management plan:

- Aerial photograph or map and a soil map of the site
- Topographic map of the site
- Current and/or planned crop sequence or crop rotation.
- Results of soil tests and manure and/or organic by-product sample analyses.
- Realistic expected yields for crops in the rotation.
- Type, number and average size of animals, quantities of manure generated, times of the year this manure will be available or must be used, quantities of manure used on the farm (includes any imported manure) and quantities of manure exported, as applicable.
- Nutrient budget accounting for all sources of nitrogen, phosphorus, and potassium for the specific crop year and if applicable for the crop rotation.
- Recommended nutrient sources, application rates, timing, method of application and if incorporated how soon after application.
- Record of the phosphorus index rating for each management unit including documentation.
- Location of sensitive areas and/or areas restricted from application.
- Guidance for implementation, operation, maintenance and record keeping.
- A statement that the plan was developed based on the requirements of the current standard.

The following components shall be included in the nutrient management plan where applicable:

- Long and/or short term waste storage along with size and condition.

- BMPs specifically needed to address phosphorus movement planned to address criteria within the P index.
- BMPs or management activities determined by specific regulation, program requirements, or producer goals.

OPERATION AND MAINTENANCE

The owner/operator is responsible for safe operation and maintenance of this practice including all equipment. The nutrient management plan should address the following items and others as appropriate:

- Review plans every three years to determine if adjustments or modifications to the plan are needed.
- Protection of fertilizer and organic by-product storage facilities from weather and accidental leakage or spillage.
- Calibration of application equipment to ensure uniform distribution of material at planned rates.
- Workers should be protected from and avoid unnecessary contact with chemical fertilizers and organic by-products. Protection should include the use of protective clothing when working with plant nutrients. Extra caution must be taken when handling ammonia sources of nutrients, or when dealing with enclosures.
- Properly dispose of material generated when cleaning nutrient application equipment. Excess material should be collected and stored or field applied in an appropriate manner. Disposal or recycling of nutrient containers should be done according to state and local guidelines or regulations.

RECORD KEEPING

The owner/operator is responsible for maintaining records to document plan implementation. As applicable, records include:

- Soil test results and recommendations for nutrient application.
- Quantities, analyses and sources of nutrients applied.

- Actual rate at which nutrients were applied. When the actual rates used differ from the planned rates, records will indicate the reasons for the differences.
- Dates and method of nutrient applications.
- Crops planted, crop yields and additional residues removed.
- Dates of 3-year review, person performing the review and recommendations.
- Records should be maintained for three years, or for a longer period if more stringent requirements apply.

REFERENCES

1. The Agronomy Guide (current edition)
Penn State College of Agricultural Sciences
2. Pennsylvania Nutrient Management Act Regulations; PA Code Title 25, Chapter 83
3. Manure Management Manual;
PA Department of Environmental Protection
4. National Agronomy Manual; USDA NRCS
5. Agricultural Waste Management Field Handbook; USDA NRCS
6. PA Code Title 25, Chapter 271;
PA Department of Environmental Protection
7. UCL60 Land Application of Sewage Sludge in Pennsylvania: A Plain English Tour of the Regulation (1999) Penn State College of Agricultural Sciences
8. UCL63 Land Application of Sewage Sludge in Pennsylvania: Use of Biosolids in Crop Production (1999) Penn State College of Agricultural Sciences

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.